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ABSTRACT

The graduate student survey, conducted annually by the American Institute of Physics, derives its data from individual physics and astronomy students and focuses on the general characteristics of graduate students as well as their initial employment. Tables, accompanied by some narration, present these data on physics graduate students (1979-80 unless otherwise noted): employment offers for new doctorate recipients, 1975-80; employment offers for new masters recipients, 1979-80; demographic characteristics of the population (sex, U.S. v. foreign citizenship, type of high school physics, type of bachelor's institutions, major of bachelor's degree, type of graduate institution, full- or part-time student status, and source of financial support); characteristics of minority group students, 1979-80; number of students by subfield and years of study completed, 1979-80; sources of student support, by sex and degree status, 1979-80; number of advanced students, by sex and degree status, 1979-80; number of advanced students specializing in selected experimental or theoretical subfields, by years of study completed, 1979-80; type of doctoral research, by years of study completed; subfield distribution of numbers of employment offers, doctorate recipients, 1979-80; post-degree plans of terminal master's recipients, 1979-80; subfield distribution of numbers of employment offers for terminal master's recipients, 1979-80; employment characteristics of master's recipients; background characteristics and post-doctorate status; use of physics in permanent employment; median monthly salaries paid by U.S. employers to new graduates; place and type of employment. Data on 1979-80 astronomy graduates include: distribution by subfield and years of graduate study, characteristics, terminal master's and doctorate recipients, and background characteristics and post-doctorate status. (MSE)

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1979–80 GRADUATE STUDENT SURVEY

by Susanne D. Ellis

AIP Pub. No. R-207.13

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The Graduate Student Survey, conducted annually, derives its data from the individual physics and astronomy students and focuses on the general characteristics of graduate students as well as their initial emoloyment. It is almost 20 years since this survey was conducted for the first time; it included only physics students until six years ago when the astronomy students were added. Highlights of this report are:

- –foreign students comprise 30% of the first-year graduate physics students
- –the demand for physics graduates continues to increase
- –salaries paid to new doctoral physicists increased by 17%

Figures I and **II** clearly indicate a favorable and improving job market for new physicists with graduate degrees. The percentage of doctorate recipients without immediate job offers declined from an already low 6% to 2%, and the percentage of new doctors, who reported multiple offers continued to increase. The demand for new physics masters, of which there are fewer than new doctors, appears to be increasing too; this conclusion was drawn from **Figure II** where the proportion of masters with multiple employment offers increased from the previous year while the proportion with "zero offers" declined by one percentage point.

Fig. I. Employment offers for new physics doctorate recipients 1975–80

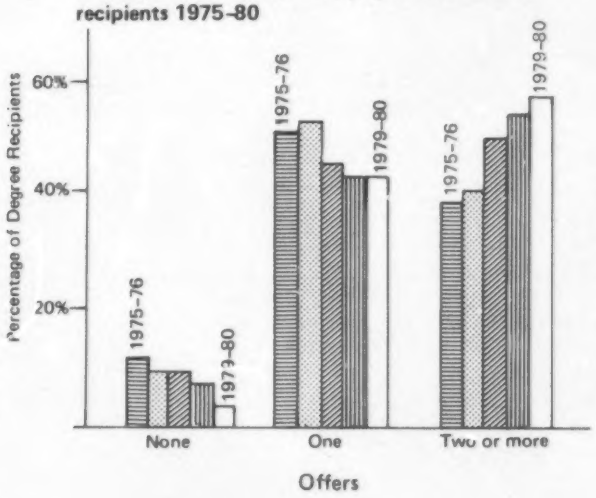

Fig. II. Employment offers for new physics masters 1975–80

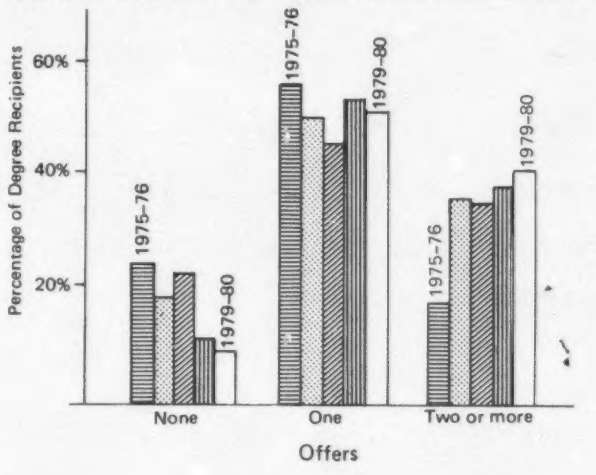

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Table I. Characteristics of the graduate physics student population, 1979–80.

Characteristics		All graduate students	First-year graduate students	Degree recipients: Terminal masters	Degree recipients: Doctorate recipients
	Total population:	9647	2439	606	912
	Number of respondents:	6107	1208	301	529
Sex	Female	10%	12%	8%	6%
	Male	90	88	92	94
Citizenship	U.S.	74%	70%	85%	78%
	Foreign	26	30	15	22
Type of High school physics	PSSC	29%	27%	25%	33%
	Project physics	8	11	8	5
	Other	55	50	57	57
	None	8	12	10	5
Type of bachelor's institution	PhD-granting	49%	47%	42%	60%
	MS-granting	9	11	21	4
	BS/BA-granting	19	17	23	15
	Foreign	23	25	14	21
Major of bachelor's degree	Physics	89%	85%	85%	91%
	Mathematics	3	4	3	2
	Engineering	3	4	4	3
	Other	5	7	8	4
Type of graduate institution	PhD-granting	91%	85%	72%	100%
	MS-granting	9	15	28	-
Student status	Full-time	89%	89%	83%	89%
	Part-time	11	11	17	11
Source of support	Teaching assistantship	35%	56%	44%	15%
	Research assistantship	40	14	13	61
	Fellowship	10	11	4	9
	Employment	9	12	21	12
	Family, savings, loan	2	4	5	2
	Other	4	3	13	1

Of the eight characteristics presented in **Table I** two of them are likely to influence the demand for physicists; they are (1) the rising proportion of foreign graduate students, and (2) the small influx into physics from other disciplines.

The first implies that an increasing proportion of the one thousand new doctoral physicists, expected to graduate in each of the next five years, will return to their native countries which largely financed that graduate education in the U.S., and this emigration will reduce the new supply of physicists available to American employers. The second characteristic, the small influx into physics at advanced levels implies that introductory physics courses need to do a better job of capturing the interest of students at the freshman-sophomore level, especially since few secondary schools perform that function.

Also noteworthy in **Table I** is the across-the-board increase in teaching assistantships, most conspicuous for first-year students which recorded a five percentage-point increase from the previous year.

Almost 1400 graduate physics students identified themselves as members of one of the eight specific minority groups listed in **Table II**. When considering the employment opportunities in the U.S. it is important to distinguish between U.S. and foreign minorities. Of the eight groups listed, six are either predominantly U.S. or predominantly foreign citizens, whereas blacks and Orientals include substantial numbers of both. For that reason blacks and Orientals are analyzed by citizenship. Examining the five characteristics of **Table II** we find that U.S. blacks have a substantially larger porportion of part-time students than the other groups listed. By far the largest minority group remains that of Orientals, while Arabs form the fastest expanding group. All the numbers in **Table II** can be considered lower limits because they reflect the willingness of the survey respondents to identify themselves as minorities on the questionnaires rather than the absolute totals.

Table II. Characteristics of minority group physics students, 1979–80.

Characteristics		Black U.S.	Black Foreign	American Indian	Puerto Rican	Mexican American	Other Latin American	Asian Indian	Oriental U.S.	Oriental Foreign	Arab
	Total number:	50	21	11	15	11	119	329	92	556	169
Sex	Female	5	-	2	4	-	17	53	13	71	18
	Male	45	21	9	11	11	102	276	79	485	151
Full-time equivalent years of graduate study	≤ 1	12	6	4	4	3	17	38	12	116	27
	2	9	4	1	5	2	21	63	17	118	41
	3	6	2	-	2	-	29	45	17	105	33
	4	7	1	2	-	4	21	58	18	75	31
	5	5	6	1	2	1	18	55	15	64	17
	6	4	2	2	1	-	7	34	5	51	9
	≥ 7	7	-	1	1	1	6	36	8	27	11
Student status	Full-time	38	20	8	15	9	114	318	87	534	164
	Part-time	12	1	3	-	2	5	11	5	22	5
Subfields	Electron, atomic, molec.	5	1	1	3	2	7	26	6	39	22
	Elem. particles	4	-	3	1	2	20	38	15	64	19
	Nuclear	5	5	-	-	-	9	40	6	47	36
	Optics	6	-	-	1	1	2	18	3	36	7
	Solid state	11	7	1	6	2	43	124	24	205	48
	Applied physics	3	-	-	-	-	3	6	3	19	6
	Cross-discipl. areas	1	2	1	-	-	6	17	6	27	2
	Other subfields	15	6	5	4	4	29	60	29	119	29
Graduate degree recipients	Terminal master's	← 12 →		1	1	1	5	2	← 21 →		8
	Doctorate	← 8 →		1	2	2	10	32	← 48 →		8

Table III quotes the total number of graduate students from the Enrollments and Degrees survey (9647) and estimates the students' distribution by major subfield and level of graduate study. One of the functions of the table is to give an indication of the approximate number of graduates within the major subfields who will be in the employment market shortly. The median number of years of graduate study spent to get a physics doctorate is 5.2. The overall distribution of subfields is very close to that of the previous year.

Table III. Number of graduate physics students, by subfield and years of graduate study completed, 1979–80.

		Full-time equivalent years of graduate study ≤ 1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	≥ 9 yrs.	Total graduate students N	%
Distribution* of students	N	2439	1910	1456	1292	1119	704	376	197	154	9647**	
	%	25.3	19.8	15.1	13.4	11.6	7.3	3.9	2.0	1.6		100.0
Astrophysics		127	94	93	71	47	24	24	3	8	491	5.1
Biophysics		78	55	46	24	44	21	24	13	5	310	3.2
Electron, atomic, molecular		124	131	131	127	107	69	33	37	18	777	8.2
Elem. particles		251	204	191	203	147	109	50	24	14	1193	12.4
Math. physics		168	126	77	69	50	22	17	8	2	539	5.7
Nuclear physics		200	161	159	109	124	64	43	13	13	886	9.2
Optics		154	157	74	58	43	36	13	12	3	550	5.6
Plasmas		107	91	78	76	69	53	38	1	16	529	5.5
Solid state physics		537	493	440	379	375	224	104	64	54	2670	28.0
Other subfields		693	398	167	176	113	82	30	22	21	1702	17.1

* *The distribution of students in each subfield is based on the 6024 respondents to this question.*
** *The total was derived from the Survey of Enrollments and Degrees.*

Table IV. Sources of support for graduate physics students, by sex and degree status, 1979–80.

Source of support		Female	Male	Candidates for: Terminal master's	Master's enroute to PhD	PhD after master's	PhD only	Total N	Total %
Teaching assistantship		38%	34%	46%	47%	26%	32%	2076	34%
Research assistantship		33	41	11	28	51	47	2455	40
Fellowship		11	9	5	9	9	12	574	9
Employment		9	9	23	9	9	3	550	9
Family, savings, loan		5	2	6	2	2	2	153	3
Other		1	3	6	2	1	2	152	3
Multiple sources of support, primarily with teaching assistantships		3	2	3	3	2	2	147	2
		100%	100%	100%	100%	100%	100%		
Total respondents	N	562	5545	745	1270	2614	1478	6107	
	%	10%	90%	12%	21%	43%	24%		100%

Table V. Number * of advanced graduate physics students specializing in selected experimental or theoretical subfields by years of graduate study completed, 1979–80.

Physics subfields	Type of research	Full-time equivalent years of graduate study: 3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	≥ 9 yrs.	Total N	Total %	%
Astrophysics	experimental	39	23	19	16	6	-	2	105	3.6%	
	theoretical	17	27	12	10	10	-	4	80		5.0%
Biophysics	experimental	32	14	29	16	12	12	2	117	4.0	
Electron, atomic molecular	experimental	72	75	59	44	22	28	12	312	10.7	
	theoretical	33	25	29	16	10	-	-	113		7.1
Elem. particles	experimental	101	113	80	67	38	12	8	419	14.4	
	theoretical	80	92	62	49	12	6	6	307		19.3
Math. physics	theoretical	78	75	50	23	15	8	2	251		15.8
Nuclear	experimental	99	64	79	44	16	10	6	318	10.9	
	theoretical	34	35	42	22	17	2	2	154		9.7
Optics	experimental	40	26	21	14	6	8	2	117	4.0	
Plasmas	experimental	43	36	36	33	20	2	11	181	6.2	
	theoretical	26	24	31	15	7	-	4	107		6.8
Solid state	experimental	278	267	255	155	78	44	33	1110	38.1	
	theoretical	102	92	89	30	10	3	3	329		20.7
Other subfields	experimental	59	64	54	40	9	5	5	236	8.1	
	theoretical	52	69	60	32	15	12	8	248		15.6
Total**	experimental	763	682	632	429	207	121	81	2915	100.0%	
	theoretical	422	439	375	197	96	31	29	1589		100.0%

* *The numbers in this table have been scaled up to reflect the total number of graduate students (5298) who completed three or more years of graduate study.*

** *In addition to the graduate students working on an experimental or theoretical thesis there are an estimated 794 graduate physics students who describe their studies as both experimental and theoretical.*

Table VI. Type of research performed by doctoral candidates with respect to years of graduate study completed, 1979–80.

Type of research	Full-time equivalent years of graduate study 3 or 4 yrs.	5 or 6 yrs.	≥ 7 yrs.	Total ≥ 3 yrs.
Experimental	53%	57%	61%	55%
Theoretical	31	30	24	30
Both	16	13	15	15
Total	100%	100%	100%	100%
Number of students	2748	1823	727	5298

Candidacy for a specific degree influences the source of support a graduate physics student can expect to receive. The terminal master's degree candidates for example are less likely to be offered fellowships or research assistantships, and have the highest proportion of degree candidates who support themselves by means of off-campus employment. These statistics and others are presented in **Table IV** which also shows that women graduate students are less likely to be granted research assistantships than male graduate students. The two percentages presented in **Table IV** (33% and 41%) were 35% and 39% for women and men respectively in the previous year.

Many requests from the physics community concern physicists in a specific subfield and with a certain type of research. Although all level graduate students are asked to specify their areas of concentration, it is only from the third year on that identification of the subfields becomes more meaningful, and the students have made the decision on whether their dissertations are experimental or theoretical. **Table V** presents an array of doctoral candidates grouped by type of research, subfield, and years of graduate study completed. The information in this table also gives some indication of the time required to complete doctorates in the different subfields.

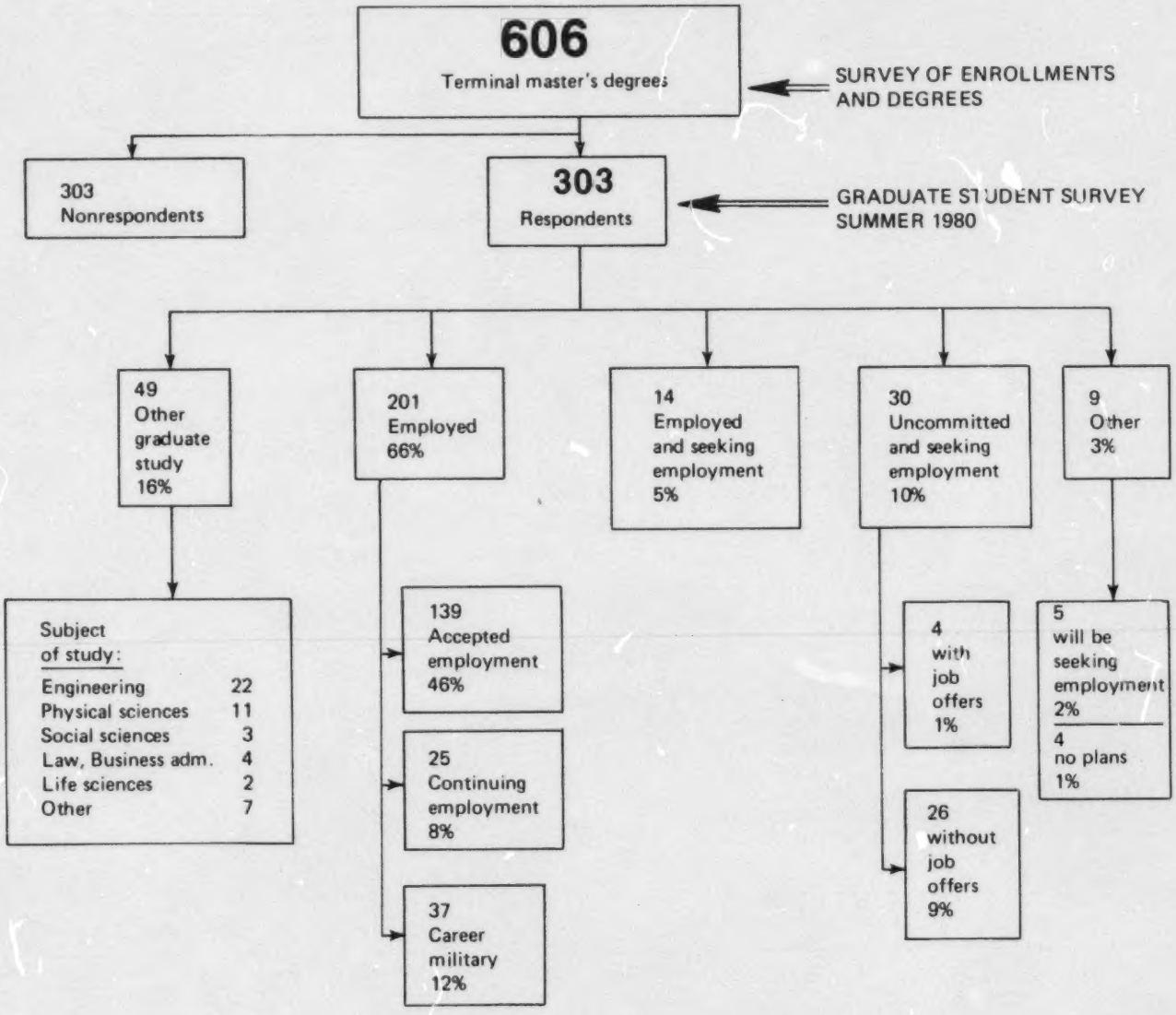
Combining all subfields **Table VI** focuses on the types of research and shows that a theoretical doctoral thesis appears to require less time than an experimental one.

Table VII analyzes the employment offers of 522 physics doctorate recipients who are either committed to, or seeking a position, and relates these offers to the major subfields. So few received no job offers, that the only meaningful variation is in the last two columns. Combining all experimentalists and all theoreticians but excluding those 15% of the graduates who reported both types of research, we find a slightly greater demand for experimentalists than theoreticians.

Table VII. Distribution, by subfield, of the number of employment offers for doctorate recipients, 1979–80.

Physics subfield	Total in subfield	Percentage of graduates within subfield received: 0 offer	1 offer	≥ 2 offers
Astrophysics	3.1	0%	71%	29%
Biophysics	3.4	0	53	47
Elec., atomic, molecular	9.1	0	47	53
Elem. particles	13.4	3	41	56
Math. physics	4.1	6	50	44
Nuclear	14.3	3	41	56
Optics	3.9	0	41	59
Plasmas, fluids	7.1	6	32	62
Solid state	29.3	1	35	64
All other subfields combined	12.3	4	48	48
Total	100.0%	2%	42%	56%
All experimental subfields		1%	39%	60%
All theoretical subfields		3	41	56

Fig. III. Post-degree plans of physics terminal master's degree recipients, 1979–80.



The students who have chosen to terminate their study of physics at the master's level, generally do so to take advantage of a favorable job market. But that is not their only option; **Figure III** shows that 16% of the 1980 masters continued their graduate studies but in another discipline, primarily in engineering. In the previous year only 14% of the terminal masters chose nonphysics graduate study at that level.

One should also take into account that the total number of terminal master's degrees granted each year in physics has steadily declined to half of what it was in 1970; hence fewer masters are available each year to fill the positions offered. One consequence of that appears to be the temptation to accept a new position rather than continue with pre-graduation employment. Only 12% of the employed terminal master's respondents are continuing their employment in contrast to 24% of a similar group for the previous year.

Table VIII. Distribution, by subfield, of the number of employment offers for terminal masters, 1979–80.

Physics subfield	Total in subfield*	Employment offers received: 0	1	> 2	Total for each subfield
Astrophysics	4.6%	0%	36%	64%	100%
Electron, atomic, molecular	7.3	10	60	30	100
Elem. particles	4.8	23	31	46	100
Engineering & Applied physics	7.1	10	30	60	100
Fusion, fluids	5.9	11	67	22	100
Nuclear	6.6	14	36	50	100
Optics	14.7	8	54	38	100
Solid state	21.2	6	56	38	100
Cross-discipl. areas	7.6	13	60	27	100
General physics	10.5	28	28	44	100
All other subfields	9.7	12	59	29	100
All subfields combined	100.0	11%	49%	40%	100%
Employment-oriented respondents	245	26	120	99	

** Based on all 303 survey respondents.*

By expanding the "employed" and "uncommitted" groups of **Figure III** we arrive at **Table VIII** which relates the employment offers to the subfields those masters pursued in graduate school. Listing only those subfields chosen by at least 5% of the master's degree candidates, one finds that the largest subfield, solid state physics, has almost the lowest percentage of graduates with "zero job offers". On the other hand "general physics", describing candidates who chose not to specialize, appears to be least in demand by reporting the highest percentage of candidates without job offers.

A closer look at what those employment offers yielded is presented in **Table IX.** Those 201 employed masters included only 4 graduates who left the U.S. to return to their native countries, and they too listed their employers and work activities.

As expected, the changes in work activities from the previous year were away from teaching, by 3 percentage-points, and toward research and development by 4 percentage-points. Industry remains the largest employer of physics masters, and 37 graduates who start a military career are included with the 54 respondents listed under "Government".

Table IX. Employment characteristics of 1979–80 recipients of master's degrees.

Work activity		Sec. school	Coll.	Univ.	Industry	Gov't inc. mil.	FFRC	Nonprofit org.	Total N	%
Teaching		11	7	3	-	1	-	-	22	11
Research		-	-	3	4	6	-	1	14	7
Res. and dev.		-	-	-	46	17	2	1	66	33
Engineering		-	-	3	36	18	-	1	58	29
Computer sci.		-	-	2	7	-	-	1	10	5
Nonphysics prof'l		-	-	-	5	4	-	-	9	4
Management training		-	-	-	2	8	-	-	10	5
Other		-	1	3	7	-	1	-	12	6
Total	N	11	8	14	107	54	3	4	201	
	%	5	4	7	53	27	2	2		100%

Figure IV. Background characteristics and post-doctorate status of 1979–80 physics graduates

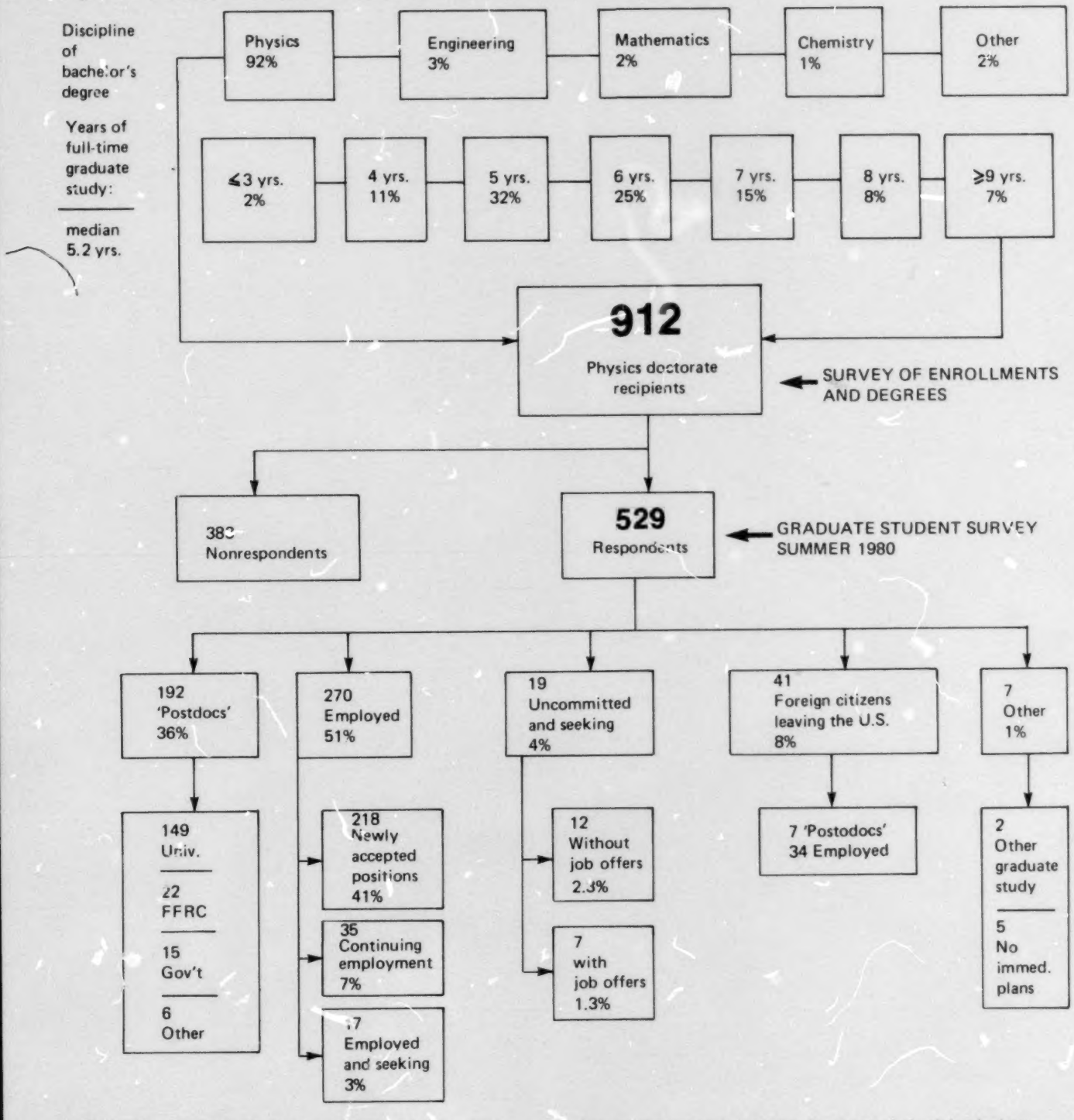


Figure IV presents the background characteristics and post-doctorate status of the 1979-80 physics graduates. Although the median number of years of graduate study required to complete the PhD remained at 5.2, the percentage of doctoral candidates taking 7 or more years increased from 25% to 30% between the class of 1979 and 1980. A look at the post-doctorate activities shows a sharp increase in one year from 3% to 8%, in foreign citizens who return to their native countries. And this trend is expected to continue for the next five years.

But the improving job market for doctoral physicists is shown in other respects too. For example **Figure IV** lists a group of 17 new physicists who referred to themselves as "employed and seeking". One year earlier this group was three times as large; apparently, accepting unsatisfactory positions is becoming rarer as the job market improves.

Table X. Use of physics in potentially permanent employment of graduate degree recipients, 1979–80.

	Major employer	Extensive use of physics training with respect to: method	subject matter	Total number responding to question
Doctorate recipients	University	94%	80%	34
	College	82	92	12
	Industry	84	65	128
	FFRC	94	83	18
	Government	90	90	20
	Total	87%	72%	212

		Use of physics training with respect to subject matter: Extensive	Little	None	Total reporting
Terminal masters	Educational inst.	78%	18%	4%	23
	Industry	54	40	6	81
	FFRC/Gov't	42	56	2	48
	Other	-	100	-	3
	Total	53%	43%	4%	155

Since the majority of employment-oriented respondents to this Graduate Student Survey had started employment by the time they complete their survey forms, it seemed reasonable to ask them to evaluate the extent to which they used their physics training. **Table X** is based on the responses to that evaluation question but excludes the answers from 'postdocs'. In recent years graduates who had accepted postdoctoral fellowships frequently did so to continue the research on which their dissertation was based; hence making extensive use of their training was taken for granted. Thus **Table X** includes doctorate recipients who had started their potentially permanent employment, as well as new physics masters.

Although both groups of graduates answered the question which distinguishes between using the subject matter or the research methods in their work, the latter appeared to be more meaningful in an analysis of the doctoral graduates, while three levels of utilizing one's training with respect to subject matter seemed to apply to the masters. When comparing the findings of these data with those of the previous year fewer masters make extensive use of their training, while a greater proportion of doctoral physicists make extensive use of both method and subject matter.

Starting salaries are presented in **Table XI** and include only those of graduates who accepted new positions; degree recipients who continued their work with the same employer and without a promotion to a new position are excluded from this table. Though not collected as part of this survey, we included the starting salaries of new physics bachelors in **Table XI** for the purpose of comparison. The median monthly salary of new masters has risen by almost 10% between 1979 and 1980. Only fourteen of the women among the masters reported their starting salaries and nine of them accepted industrial positions.

Postdoctoral fellowships always entail a lower salary than positions with potential permanence, therefore **Table XI** presents the two groups of salaries in separate columns. The overall increase from the previous year is 8% for the fellowships most of which are paid by universities; the doctoral positions with potential permanence showed an increase of 17%. Industrial positions which pay the highest salaries were accepted by a greater proportion of the new doctoral graduates in 1980 than in previous years.

Table XI. Median monthly salaries paid by U.S. employers to new physics graduates, 1979–80.**

	Bachelor's recipients		Terminal master's recipients		Doctorate recipients			
					Percentage accepting:		Monthly starting salaries for:	
Type of employer	Percentage accepting positions	Monthly starting salaries	Percentage accepting positions	Monthly starting salaries	'Postdocs'	Potentially permanent pos.	'Postdocs'	Potentially permanent pos.
Secondary school	3%	$ 960	6%	$1350	-	-	*	*
4-year college University	3	1150	4 8	* *	- 36%	3 9	* $1260	* $1400
Industry	61	1650	50	1790	-	31	*	2270
Government incl. Military	24	1090	28	1550	4	5	1650	2040
Fed. Funded Res. Ctr.	-	-	2	*	5	5	1580	2150
Other	9	1590	2	1400	1	1	*	1600
All employers	100%	$1560	100%	$1740	100%		$1310	$2200

* *Fewer than ten graduates reported salaries.*

** *Salaries shown in this table are based on newly accepted positions.*

Table XII. Place and type of employment of U.S. and foreign physics doctorate recipients, 1979-80.

Type of employment	in the U.S.		outside the U.S.		Total
	Citizenship U.S.	Foreign	Citizenship U.S.	Foreign	
Postdoc'	140	31	9	7	187
Potentially permanent	213	32	3	34	282
Total N	353	63	12	41	469
Total %	75%	13%	3%	9%	100%

The employment opportunities for doctoral physicists have been discussed earlier in this report, but not with a view toward the fluctuations foreign degree recipients introduce into the U.S. job market. As the proportion of foreign degree recipients among the new physics doctors rises, an increasing demand for physicists will induce employers to get the visas of foreign graduates changed to those that permit them to work in the U.S. On the other hand, a declining demand would effect the return of more foreign degree recipients to their native countries. Table XII relates the citizenship of the 1979-80 doctoral graduates to their employment within or outside the U.S.; the group to focus on is that of the 63 physicists (or 13%) with foreign citizenship whose initial employment is in the U.S. Since 1977 when we first analyzed these characteristics the percentage of U.S. citizens who reported initial employment outside the United States remained extremely small.

ASTRONOMY

The Survey of Graduate Astronomy Students was started six years ago and is based on data contributed by over 500 students enrolled in 50 graduate astronomy departments. Of those, 32 are separate graduate astronomy departments and 18 are combined with graduate physics departments. Reports from the department chairmen to another survey indicate a leveling trend of the graduate astronomy enrollment just under 700 students, a decline from 800 students during the mid 1970's.

Table XIII. Graduate astronomy students by subfield and years of graduate study, 1979-80.

	Full-time equivalent years of graduate study						Total graduate students	
	≤ 1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	≥ 6 yrs.	N	%
Distribution of students N	154	126	105	112	105	96	698	
%	22	18	15	16	15	14		100
Astronomy subfields								
Astronomical instruments and techniques	5%	8%	3%	7%	4%	6%	40	6%
Cosmology, extragalactic objects, quasi-stellar objects	26	11	19	30	27	16	147	21
Galactic structure, stellar motions	7	8	8	1	5	4	40	6
Interstellar matter and gaseous nebulae	6	11	14	16	17	14	91	13
Solar system, space astronomy of the solar system	4	7	12	9	8	2	43	6
Stellar atmospheres and spectra, stellar evolution, solar and stellar interiors	14	14	13	19	27	38	148	21
Supernovae, X, γ and cosmic rays, pulsars	4	8	9	5	5	6	42	6
The sun	1	1	5	4	1	5	21	3
Astrophysics	18	24	12	5	3	6	77	11
All other subfields combined	15	8	5	4	3	3	49	7
	100%	100%	100%	100%	100%	100%		100%

** The percentages shown in this table are based on 536 respondents to the Graduate Student Survey. Astronomy department chairmen reported a total of 698 graduate students for the Survey of Enrollments and Degrees.*

Table XIII presents the distribution of graduate students by level of graduate study and lists nine major subfields including astrophysics. Only 41% of the astronomy students describe their research as observational compared with 51% of the physics students who are experimentalists.

Table XIV lists eight characteristics of all graduate astronomy students as well as for three subgroups: the first-year graduate students, the terminal master's degree recipients and the doctorate recipients. When compared with the graduate physics students, the astronomy students include a higher proportion of women and a lower proportion of foreign students. The majority of them majored in physics as undergraduates which can be attributed to the fact that only 57 institutions in the U.S. offer an astronomy bachelor's degree.

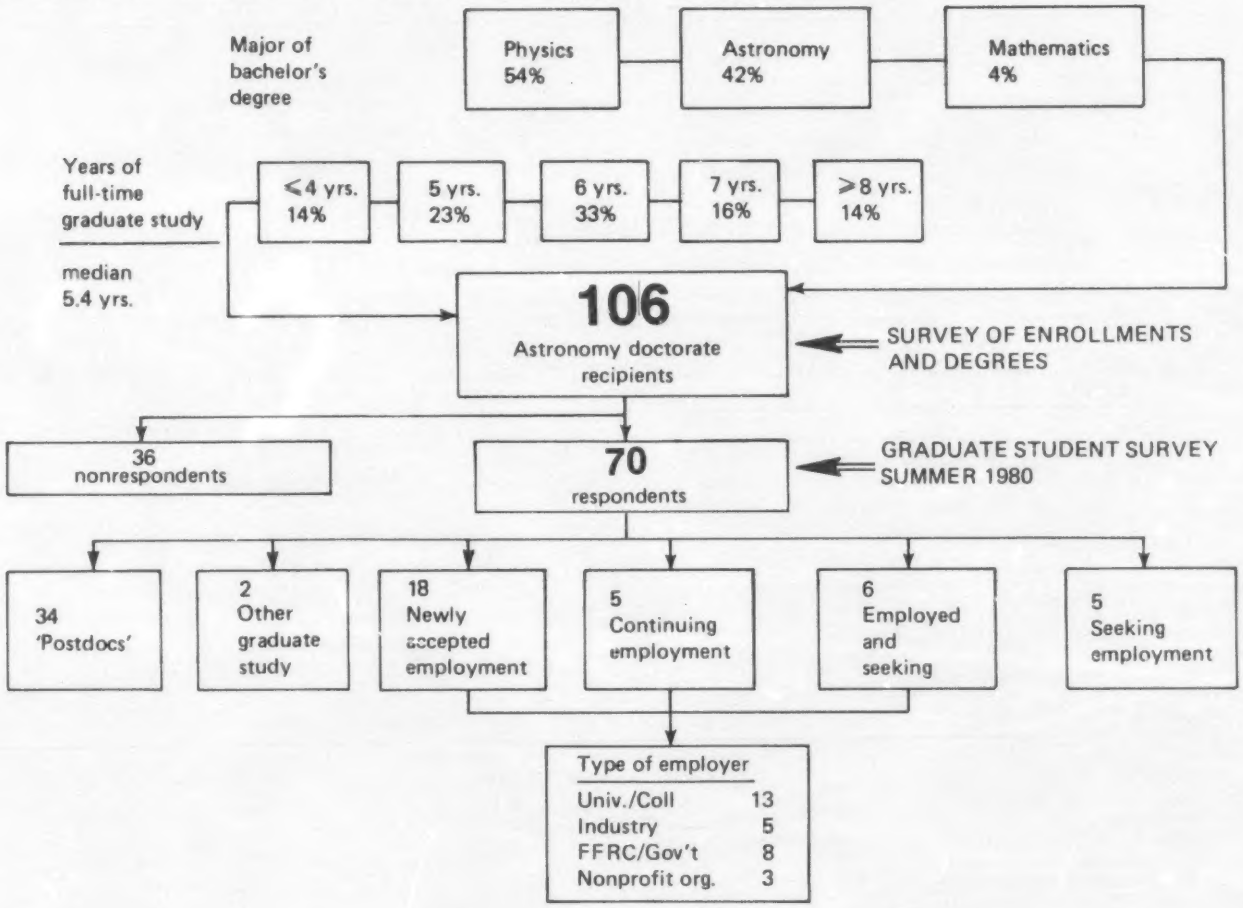
Table XIV. Characteristics of astronomy graduate students, terminal master's degree– and doctorate-recipients, 1979–80.

Characteristics		All graduate students	First yr. graduate students	Terminal master's degree recipients	Doctorate recipients
	Total population*	698	154	27	106
	No. of respondents	536	101	15	70
Sex	Female	14%	13%	15%	12%
	Male	86	87	85	88
Citizenship	U.S.	87%	88%	100%	86%
	Foreign	13	12	-	11
Type of high school physics	PSSC**	30%	20%	13%	26%
	Project physics	7	10	13	6
	Other	56	63	67	64
	None	7	7	7	4
Major of bachelor's degree	Astronomy	38%	30%	67%	42%
	Physics	52	56	33	54
	Mathematics	4	5	-	4
	Engineering	3	4	-	-
	Other	3	5	-	-
Type of bachelor's institution	PhD-granting	64%	62%	40%	66%
	MS-granting	7	9	20	6
	BS/BA-granting	18	19	40	15
	Foreign	11	10	-	13
Type of graduate institution	PhD-granting	96%	90%	80%	100%
	MS-granting	4	10	20	-
Student status	Full-time	91%	90%	80%	86%
	Part-time	9	10	20	14
Source of support	Teaching assist.	30%	41%	40%	11%
	Research assist.	39	12	13	51
	Fellowship	16	29	13	11
	Employment	8	9	27	14
	Family, savings, loan	3	9	7	6
	Other	4	-	-	7

* *These totals were reported by astronomy department chairmen as part of the Survey of Enrollments and Degrees.*

** *The Physical Science Study Committee (PSSC) course became available for general use in 1960. Since the late 1960's the percentage of graduate physics students who took PSSC in high school has increased and levelled off.*

Fig. V. Background characteristics and post-doctorate status of 1979–80 astronomy graduates.



The 106 astronomy doctorates granted between July 1979 and June 1980 represent a sharp increase from the 90 degrees granted during the previous year. Examining their background characteristics in **Figure V**. one notes that only two closely related disciplines contributed their graduates to the new supply of doctoral astronomers. In previous years "engineering" and "other" were listed among the disciplines studied by astronomers as undergraduates. The employment opportunities for those new astronomers show little change from earlier years.

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